CITY OF CUPERTINO
GENERAL PLAN AMENDMENT
1-GPA-80
TECHNICAL APPENDIX - D

AIR QUALITY IMPACT
AND
MITIGATION MEASURES

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MAY 23, 1983

STATE CLEARINGHOUSE NUMBER 81030308

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CUPERTINO GENERAL PLAN AMENDMENT

AIR QUALITY SECTION

INTRODUCTION

The air quality of a given area is not only dependent upon the amount of air pollutants emitted locally or within the air basin, but also is directly related to the weather patterns of the region. The wind speed and direction, the temperature profile in the atmosphere, and the amount of humidity and sunlight determine the fate of the emitted pollutants on a given day, and hence determine the resulting concentrations of air pollutants defining the "air quality."

I. Setting

A. Regional Climate. The Bay Area climate is a Mediterranean type, characterized by mild and rainy winters November through March, and warm and nearly dry summers June through September. There is a high percentage of sunshine, particularly in the summer. The movements of marine air establish the temperature, humidity, wind, and precipitation throughout the year, which in turn depend upon the location and strength of the dominant Pacific high-pressure system and the coastal temperature gradient. Average temperatures increase as distance from the Golden Gate increases.

During the summer the Pacific high typically sits near the California Coast, pushing oncoming storms north through the northwest states and Canada. Subsidence of warm air aloft associated with this system creates the frequent summer atmospheric temperature inversion and stagnated conditions. (See the Appendix for definitions of commonly-used meteorological and air quality terms.) This persistent reversal of the normal atmospheric temperature lapse rate may be several hundred to several thousand feet thick, effectively trapping pollutants emitted at ground level. Winds during the summer are generally light, except for late afternoon onshore flow from differential heating between the cool ocean and warm land mass. Average maximum temperatures during the summer are near 80° F. in the South Bay, while average minimums are near 50° F.

During the winter the Pacific high pressure system moves southward, allowing ocean-formed storms to move through the region. As they approach, winds are typically from the southeast at 10-20 miles per hour, and as the storm passes they turn northeast. Gusting winds of 20-40 mph are common during storms. With the dominance of unstable low-pressure systems during the winter, and less sunshine, conditions conducive to smog formation are at a minimum. However, radiation cooling during the evening hours sometimes creates thin inversions, concentrating carbon monoxide emissions at ground level. Average maximum winter temperatures in Santa Clara County are about 60°F., and average lows are approximately 40° F.

Lying in the rain shadow of the Santa Cruz Mountains, the South Bay receives only 2/3 of the precipitation which falls upon San Francisco, and a quarter of that falling in the coastal mountains. Very little rain falls in May and October, usually near half an inch, and almost none in June, July, August and September. A majority of the annual rainfall comes in December, January and February, about 3.5 inches per month during normal rainfall years. In Cupertino the annual average rainfall is in the 13-15 inch range.

B. Ambient Air Quality.

Monitoring Data. Air quality in Cupertino is subject to the same problems experienced by most of the Bay Area Air Basin, particularly the south portion. Emissions from millions of vehicle-miles of travel each day are often not mixed and diluted, but trapped near ground level by atmospheric inversion. Prevailing air currents generally sweep from the mouth of the San Francisco Bay toward the south, picking up emissions along the way and concentrating them in the basin around South Bay. A combination of local emissions, sporadic stagnated atmospheric conditions, the transport of emissions from upwind areas, and the natural barriers formed by the Santa Cruz Mountains to the southwest and the Diablo Range to the east, produces pollutant concentrations in the Cupertino area which sometimes exceed limits established by the Bay Area Air Quality Management District (BAAQMD).

Air quality data from the closest full monitoring station, San Jose, and ambient standards presently in effect, are tabulated in Exhibit 1. Several other nearby BAAQMD stations monitor only ozone. Data from the past three years for this pollutant are given in Exhibit 2.

Pollutant Contours

Another way of understanding the air quality in Cupertino, in comparison with other areas in the Bay Area Basin, is represented by pollutant contour maps. Appendix pages A-3, A-4, A-5 show contours for CO, ozone and TSP, prepared by the BAAQMD from 1981 District monitoring data and modeling studies. The maps indicate that the ozone (oxidant) standard is the one most likely to be exceeded in the Cupertino area, of all pollutants monitored.

Trends and Sources

Exhibit 3 is a list of major stationary emission sources in Santa Clara County for particulates, organics (HC), NO_x, and SO_2. Each pollutant is produced partially by stationary and partially by mobile sources.

The measured concentrations of ozone, a primary "smog" component produced by chemical reactions in the atmosphere, are heavily dependent upon weather patterns, and thus vary substantially from year to year. Since the adverse atmospheric conditions in 1978, when 12 exceedances were recorded in San Jose, high oxidant days have been under a half dozen and decreasing steadily. The 3-year Expected Annual Exceedance value is now just above 1.0, with none in 1982. Another problem pollutant in the South Bay area, carbon monoxide, is also dependent upon both weather and vehicle emissions. Incidents of concentrations of CO above the 8-hour standard increased somewhat to 9 exceedances during 1982, most of them during mid-winter evenings. Both of these air pollutants have been reduced dramatically by superior emission control systems on new automobiles in recent years.

Suspended particulates, produced by vehicles, heavy industry and soil-moving activities, increased noticeably in San Jose in 1980, apparently because of increased construction in the vicinity, dropped to new lows in 1981, and then increased again in 1982. The ambient standard for 24-hour sample concentration was exceeded on 15% of the days tested at the station in downtown San Jose.

EXHIBIT 1

AMBIENT AIR QUALITY

DOWNTOWN SAN JOSE

	1980	1981	1982	BAAQMD Standard	Measurement Units
1. Ozone -					
Maximum	17	15	12	12	pphm, 1-hour avg.
Exceedances	3	1	0	1	days per year
3-year average	6.2	2.7	1.3	1	Expected Annual Exceedances
2. Carbon Monoxide -					
Maximum 8-hour	16	10.8	12.4	9	ppm, 8-hour avg.
8-hour Exceedances	15	5	9	1	days per year
3. Nitrogen Dioxide -					
Maximum	26	22	16	25	pphm, 1-hour avg.
Exceedances	1	0	0	1	days per year
4. Sulfur Dioxide -					
Maximum	8	3	3	5	ppb, 24-hour avg.
Exceedances	0	0	0	2	% of days per year
5. Total Suspended Particulates -					
Annual Mean	74	64	66	60	annual geometric mean, ug/m^3
Daily Exceedances	25	8	15	1	percent of days per year above 100 ug/m^3

SOURCE: Bay Area Air Quality Management District.

EXHIBIT 2

OXIDANT MONITORING DATA

SOUTH BAY AREA

	1 9 8 0			1 9 8 1			1 9 8 2		
Station	Max.[1]	Exced.[2]	Avg.[3]	Max.	Exced.	Avg.	Max.	Exced.	Avg.
Mt. View	12[4]	0	0.7	14	2	1.7	11	0	0.8
Alum Rock	19	6	9.3	18	4	5.6	15	3	5.2
San Jose	17	3	6.2	15	1	2.7	12	0	1.3
Los Gatos	17	13	15.4	14	2	9.9	12	0	6.7

Source: BAAQMD

NOTES:

1. Maximum one-hour value. Ambient Standard is 12 pphm.

2. Number of annual exceedances of one-hour standard.

3. Average number of annual exceedances over past three years, designated the "Expected Annual Exceedances," adjusted for instrument down-time.

4. Data missing for Fall ozone episode season.

EXHIBIT 3

MAJOR STATIONARY SOURCES
OF AIR POLLUTANTS IN
SANTA CLARA COUNTY
(Estimated Emissions, Tons/Day-1979)

Facility	Part	Organ	NO_x	SO_2
Burke Industries Inc., San Jose	.10	.30	.01	-
Cal-Sweep Co., San Jose	-	.33	-	-
Chevron USA Inc. Bulk Plant, San Jose	-	.28	-	-
Container Corp. of America, Santa Clara	-	1.2	-	-
IBM Corp., San Jose	.03	.73	.06	-
Kaiser Aluminum & Chemical Corp. (Foil Plant), Cupertino	-	1.8	-	-
Kaiser Cement & Gypsum Corp., Cupertino	.62	.03	16	.65
Lockheed Missiles & Space Co., Inc. Sunnyvale	-	.40	.05	-
Memorex Corp., Santa Clara	-	1.6	.03	-
Owens Corning Fiberglass Corp., Santa Clara	.48	.02	.31	.04
San Jose Graphics, San Jose	-	.70	.03	-
Southern Pacific Pipe Lines Inc., San Jose	-	.56	-	-
Xidex Corp., Sunnyvale	-	1.7	-	-
Total, County Major Sources	1.23	9.65	16.49	0.69
Total, District Stationary Sources (1981 Estimate)	206	381	355	180

Sources: BAAQMD

Sulfur dioxide is primarily associated with chemical and refining industries, and has never approached the ambient standard in the project area, nor have the SO_2 ambient standards been exceeded anywhere in the District since 1976. The superior controls required on chemical process plants are largely responsible for this condition. Nitrogen oxides are produced heavily by vehicles and high-temperature industrial operations, but have not as yet posed serious problems in the region. San Jose often has the highest concentrations in the District, however.

Because there are exceedances of some ambient standards in the Bay Area, the District has been designated a Non-Attainment Area by the EPA for carbon monoxide, ozone, and total suspended particulates. All significant sources in the District must share responsibility for basin exceedances, including those sources in locations where air quality is good.

II. Potential Air Quality Impacts of Project

A. Sensitive Receptor Locations

Sensitive receptor locations which could be affected by air pollutant emissions associated with the General Plan Amendment and the Vallco development include residences, schools, parks, or health care facilities in the Cupertino area. To evaluate this potential impact, eight roadside receptor locations were chosen to represent the worst case exposure to increased traffic (see Exhibit 4 Map of locations.) Most City receptor locations are not on major arterial streets, and would be much less affected than those locations analyzed.

B. Sources of Project Pollutants

Vehicles are the only significant source of emissions associated with the project. The increased development within the Vallco and Town Center core areas will produce increasing trip generation to and from these areas and within the City, which in turn produces more vehicular emissions.

Although the GPA also increases the allowable industrial development in the area, which have stationary sources of emissions, these are stringently controlled by Bay Area Air Quality Management District Source Control standards.

EXHIBIT 4

CUPERTINO GPA AREA MAP

(n) Receptor Locations

For example, the amount of hydrocarbon emissions from an additional acre of electronic R & D manufacturing is estimated by the District at 6 pounds per day -- about the same amount as is emitted by a half mile of Stevens Creek Boulevard in one hour. In effect then, the vehicular emissions dominate impact considerations.

Potential fugitive dust entrainment during the construction phase can be controlled in a straightforward manner by application of water and/or oil to the work area.

C. Data and Methodology

Traffic data are from the City of Cupertino and project traffic studies. Impact analyses are based upon estimates of future traffic volumes for the year 1990 under the existing development plan (1979), and for the preliminary GPA and Vallco Plan (see the Traffic Section).

Vehicles are responsible for emission of a number of pollutants -- hydrocarbons, particulates, NOx, and others. However, the most widely-used indicator of vehicular emissions impact is the modeled concentration of carbon monoxide at nearby sensitive receptor locations. Vehicular pollutant emissions, and therefore concentrations in the air, are proportional to the number of vehicle trips per hour on nearby streets. Roadside concentrations are also proportional to the average vehicle emission rate, which is based on average speed.

The model used for this study is recommended by the Bay Area Air Quality Management District (Ref. 8), based upon standard Gaussian line source diffusion relationships developed by others, including Turner (Ref. 9). Assumptions include very poor atmospheric conditions (wind speeds of 1 to 2 meters per second and low inversion height), which occur on numerous occasions each year in the area. A program for the HP 41CV pocket computer to compute the simultaneous effects of a number of streets for 16 different wind directions has been developed and used by the Consultant, based upon the basic BAAQMD method. A sample computation sheet is included in the Appendix, page A-6.

Composite emission factors for the mix of vehicles projected to be operating in 1990 have been taken from tables generated by the Air Resources Board (Ref. 10).

D. Impact Analyses

Modeled maximum carbon monoxide concentrations are given for each receptor location in Exhibit 5. The cases used for comparison are: the present traffic case, development to 1990 under the Existing General Plan (1979), and development to 1990 under the Preliminary GPA and Vallco plans. The conditions include both the peak afternoon traffic hour, and also the highest continuous eight hour average traffic, which is a standard sometimes exceeded in the South Bay area.

The concentrations shown are the sum of contributions from the streets listed. Only the highest concentration produced by the sixteen wind direction computations is listed. Of course, most days and most wind conditions would produce considerably lower concentrations than those modeled. To obtain total concentrations, a background CO level of 0-4 ppm must be added. This is generated by the combination of all streets in the area and varies with atmospheric conditions.

The most notable result of the analysis is the anticipated decrease in roadside concentrations for both 1990 scenarios compared to the present case. This is due to the continuing replacement of older vehicles with new ones with better emission control equipment. The other notable aspect of the results, which does not show up after summation, is that 60 to 80% of the total concentration in each location is contributed by Interstate 280. This is important because its traffic characteristics (speed and volume) are not related to project implementation.

E. Potential Project Concentrations Vs. Ambient Standards

Ambient standards for CO are 35 ppm for peak hour conditions and 9 ppm for eight hour average. Neither ambient standard is really approached under the modeled worst-case conditions at any location evaluated. However, this is not to say that the ambient standards would never be exceeded. Under extremely poor atmospheric conditions such as zero wind speed and very low inversion heights, the eight hour average of 9 ppm is now sometimes exceeded, and may be from time to time in the future. These conditions occur sporadically during winter evenings when heavy traffic coincides with stagnated atmospheric conditions and a ground-based radiation inversion in air temperature. This condition is a regional phenomena and does not relate to any specific project or project traffic.

EXHIBIT 5

CUPERTINO GENERAL PLAN AMENDMENT

MODELED CARBON MONOXIDE CONCENTRATIONS (PPM)

Receptor[1] Area	Streets Contributing	Present Case		Existing Plan(1990)		Prelim. GPA (1990)	
		Pk. Hr	8-Hr Avg.	Pk. Hr	8-Hr Avg.	Pk. Hr	8-Hr Avg.
1 Mariani (De Anza)	I-280 Homestead De Anza	12.5	2.3	8.9	1.7	9.8	1.9
2 Town Center (De Anza)	I-280 De Anza Stevens Creek	9.2	2.1	7.1	1.6	7.8	1.5
3 Stelling Rd. (Jollyman)	I-280 Stelling Stevens Creek De Anza	7.3	1.3	5.1	1.0	5.1	1.0
4 Miller Ave. (Bollinger)	I-280 Miller Bollinger Stevens Creek	7.7	1.4	5.5	1.1	5.9	1.2
5 Homestead (Tantau)	I-280 Homestead Lawrence Expw. Wolfe Rd.	9.3	1.6	7.2	1.3	7.0	1.4

NOTES: 1. See Exhibit 4, project area map with receptor areas identified.

2. Ambient Air Quality Standards for CO are 35 ppm for peak hour conditions and 9 ppm for continuous 8-hour average.

EXHIBIT 5

CUPERTINO GENERAL PLAN AMENDMENT

MODELED CARBON MONOXIDE CONCENTRATIONS (PPM)

Continued

Receptor[1] Area	Streets Contributing	Present Case		Existing Plan(1990)		Prelim. GPA (1990)	
		Pk. Hr	8-Hr Avg.	Pk. Hr	8-Hr Avg.	Pk. Hr	8-Hr Avg.
6 Vallco West (Wheaton Dr.)	Perimeter Road Stevens Creek B. I-280 Wolfe Road	9.6	1.3	6.9	0.9	7.3	1.0
7 Tantau Avenue (Hyde Jr.H.S.)	Tantau Avenue I-280 Stevens Creek B. Lawrence Expwy.	7.4	0.9	5.1	0.7	5.2	0.6
8 Blaney Avenue (near Pacifica)	Blaney Avenue I-280 Stevens Creek B. De Anza Blvd.	6.7	0.9	4.4	0.6	4.9	0.7

F. Total Emissions of Project

Another way of assessing air quality impacts is to compute daily vehicular emissions associated with each set of conditions. This can be estimated by multiplying the VMT (vehicle miles traveled) associated with each case by the appropriate vehicle emission factor. The VMT were estimated from traffic projections on the major arterials: De Anza Blvd., Wolfe/Miller, Homestead, Stevens Creek Blvd., and Bollinger. This comparison is made below for the four pollutants of concern.

Cupertino Major Street Emissions
(Tons per day)

Case	V M T	CO	NMHC	NOx	Part.
Existing Traffic	284,000	4.9	0.41	0.63	.13
Existing Plan, 1990	340,000	5.9	0.48	0.75	.15
Prelim. GPA, 1990	386,000	6.7	0.55	0.85	.17
District - 1987	-	1940	172	186	30

The District motor vehicle emissions estimates (Reference 7) are included for comparison with those for the project.

G. Relationship of Project to District Air Quality Plan

Exhibit 6 is a list of Transportation Control Measures (TCM's) which were evaluated in the development of the 1982 Bay Area Air Quality Plan. Each TCM implemented could provide some reduction in vehicle-related emissions, even though the potential for some may be only 1 to 5% reduction. The City of Cupertino has already adopted, supported, or implemented to some extent TCM numbers 1, 3, 4, 5, and 8.

It should be noted that in the 1982 AQP the Metropolitan Transportation Commission found TCM's to be "ineffective," and adopted the following guidelines:

> "MTC policy supports measures that improve or enhance alternatives to the automobile without penalizing those dependent upon the automobile. These alternatives include transit, carpooling, and bicycle systems."

EXHIBIT 6

1982 BAY AREA
AIR QUALITY PLAN

Recommended Transportation Controls
For Local Agency and Project Implementation

General Policy: Reduce Motor Vehicle Emissions Through Transportation Actions to Reduce Vehicle Use.

The objectives of the recommendations are to discourage use of the "drive alone automobile" and to encourage use of public transit and other high-occupancy vehicle travel modes. These are aimed primarily at hydrocarbon and carbon monoxide emissions control.

1. Provide additional and improved public transit service throughout the region to increase ridership.

2. Provide additional high-occupancy vehicle (HOV) lanes on selected highway segments as justified on an individual project basis.

3. Provide preferential parking for commuter carpools and vanpools.

4. Expand commuter ride-sharing services such as vanpool and carpool matching ("RIDES"), and park-and-ride lots.

5. Develop more extensive and safe bicycle path systems, and secure storage facilities, to serve non-recreational trips.

6. Decrease local agency parking space requirements for employers who encourage car pooling and vanpooling.

7. Support flex time work policies among employers to reduce peak hour congestion.

8. Discourage local approval of commercial drive-through facilities.

9. Encourage alternative clean fuels and engines for fleet vehicle operators.

10. Encourage restrictions on vehicle idling by fleet vehicle operators.

III. Mitigation Measures

The proposed Cupertino General Plan Amendment and the Vallco future development projects would not contribute significantly to local and basin air pollution, and would not cause incidents exceeding ambient standards. However, there are unavoidable vehicle emission and air quality problems to be dealt with in the South Bay now and in the future years. Increases in the number of residents, vehicles, and vehicle miles traveled in the area will continue to intensify the problem, in spite of better emission controls on new vehicles. Because these projects contribute to this regional problem and trend, they should participate in available, feasible, and needed mitigation measures for traffic-related emissions.

Methods for reducing vehicle emissions are generally focused upon three strategies: reducing the number of vehicle trips made, reducing the number of vehicle miles traveled and reducing the number of vehicle minutes traveled. Clearly these strategies are not always mutually exclusive. Some methods meet all three objectives, some one or two. For example, changing trip modes from private automobile to public transit achieves reductions in all three criteria. Some methods which optimize one strategy may compromise another. For example, finding a short cut for a particular trip may reduce vehicle miles traveled, but if the shorter route is a congested one, the vehicle minutes would be increased, and emissions would increase also. Usually, however, methods demonstrating benefits in any criteria are desirable.

The TCM's in Exhibit 6 are a basic list of strategies for reducing use of the single-occupant vehicle. In addition, the following strategies are recommended.

1. Reduce the average trip length by improving the jobs-housing balance, and integrating residential, commercial, and industrial sectors of the community.

2. Encourage bikeway and walkway short cuts for shopping, commute and recreational trips in new developments and transporation system design.

3. Whenever possible, provide improved traffic flow, increased average speed, and reduced congestion by improved signalization and turn lanes for major intersections and routes.

REFERENCES

BAY AREA CLIMATOLOGY

1. Felton, E.L., "California's Many Climates," Pacific Books, Palo Alto, 1965.
2. Gilliam, H., "Weather of San Francisco Bay Region," University of Calif. Press, Berkeley, 1966.
3. "Summary of Meteorological Observations, Surface," Naval Weather Service Command, Moffett Field, CA.

BAY AREA AIR QUALITY

4. "Contaminant & Weather Summary," Monthly Monitoring Data, Bay Area Air Quality Management District, San Francisco.
5. "Air Quality Handbook, 1981-82," BAAQMD, San Francisco.
6. "1982 Air Quality Plan," Association of Bay Area Governments (with BAAQMD and MTC), Berkeley, July 1982.

MODELING

7. "Guidelines for Air Quality Impact Analysis of Projects," BAAQMD (then BAAPCD), June 1975, and revisions.
8. Turner, D. Bruce, "Workbook of Atmospheric Dispersion Estimates," AP-26, U. S. Environmental Protection Agency, 1970.
9. "ENV028" Composite Tables, Based upon "EMFAC 6C" vehicle emission rates for project year, California Air Resources Board, Sacramento.
10. "Procedure and Basic for Estimating On-road Motor Vehicle Emissions," Technical Services Division, California Air Resources Board, Sacramento, January 1980.

COMMON AIR QUALITY TERMS AND DEFINITIONS

Air basin or airshed - a region which, due to its geography and topography, tends to contain air pollutants emitted within it.

Air pollutant - a substance in the atmosphere which is harmful or undesirable.

Air quality - the amount of pollutants in the air relative to existing ambient air quality standards*.

Air Resources Board (ARB) - California agency responsible for state air quality planning and control program.

Ambient Air Quality Standards - exposure limits established for various air pollutants by state and federal agencies.

Bay Area Air Quality Management District (BAAQMD) - nine-count y agency responsible for air quality planning and control in the San Francisco Bay area.

Carbon monoxide (CO) - an odorless and invisible gas pollutant produced primarily by vehicle operation. Reduces oxygen-carrying capacity of the blood, causing headache, fatigue, coordination disfunction, and cardio-respiratory stress.

Concentration - the amount of a pollutant in a given volume or sample of air.

Department of Environmental Protection (NDEP) - Nevada agency responsible for state air quality planning and control programs.

Dispersion - the process of mixing, dilution, and transport of air pollutants.

Emission - discharge of a substance into the air.

Environmental Protection Agency (EPA) - federal agency with overall responsibility for national and state air quality planning and control programs.

Hydrocarbons (HC) - a large group of compounds containing hydrogen, carbon and various other elements, and found in fossil fuels, paints and solvents. They cause plant damage, odor, and contribute to smog* formation.

Inversion - a reversal of the normal temperature lapse rate* in the atmosphere, producing a stable high-temperature layer above a lower-temperature layer.

Line source - a linear group of pollutant emitters, such as vehicles on a roadway.

Micrograms per cubic meter ($\mu g/m^3$) - a common unit of measurement of particulate concentration* in weight per unit volume.

Mixing layer - when an atmospheric temperature inversion* exists, the layer of air below the inversion altitude in which air pollutants are confined.

Modeling - a technique of using estimated source emissions and meteorological information to compute expected air pollutant concentrations.

Monitoring - regular measurement of air pollutant concentrations.

Nitrogen oxides (NO_x)- formed during high-temperature combustion processes, several gaseous pollutants cause plant damage, eye and lung irritation, and discoloration of materials. Nitrogen dioxide causes the typical brown color of smog.*

Odor - can be aesthetically unpleasant, and cause illness in some cases. Common problem gases include hydrogen sulfide, ammonia, and some organic vapors.

*defined elsewhere

Organic compounds - a very large group of substances containing carbon,found in all living matter, and also fossil material such as coal and petroleum. They are often released when extracted, processed, and/or burned.

Oxidants - a highly-active group of chemicals (mostly ozone in air) formed in the atmosphere by the photochemical reaction* of hydrocarbons*, nitrogen oxides*, and sunlight. Causes extensive vegetation damage, eye irritation, headache, and impaired breathing.

Ozone (O_3) - see Oxidants above.

Particulates, total suspended (TSP) - include solid particles, dust, and smoke, and are produced by industrial processes, combustion, and vehicles. They damage plants and materials, reduce sunlight and visibility, and carry irritating chemicals into the respiratory system.

Parts per million (ppm) - a common unit of measurement of gaseous pollutant concentration in relative volume of pollutant per million volumes of air.

Photochemical reaction - the atmospheric combination of hydrocarbons* and oxides of nitrogen to form oxidants* and smog*, driven by the energy from intense sunlight.

Point source - a single stationary souce of air pollution.

Primary air quality standards - recommended limits to air pollutant concentrations based upon criteria for protection of human health.

Secondary air quality standards - recommended limits to air pollutant concentrations based upon criteria for protection of property and aesthetics.

Smog - the combination of air pollutants found during intense photochemical reaction.*

Source - a process, activity, or machine which emits air pollution.

Stagnation - an extremely stable atmospheric condition in which little vertical or horizontal dispersion* of emitted pollutants occurs.

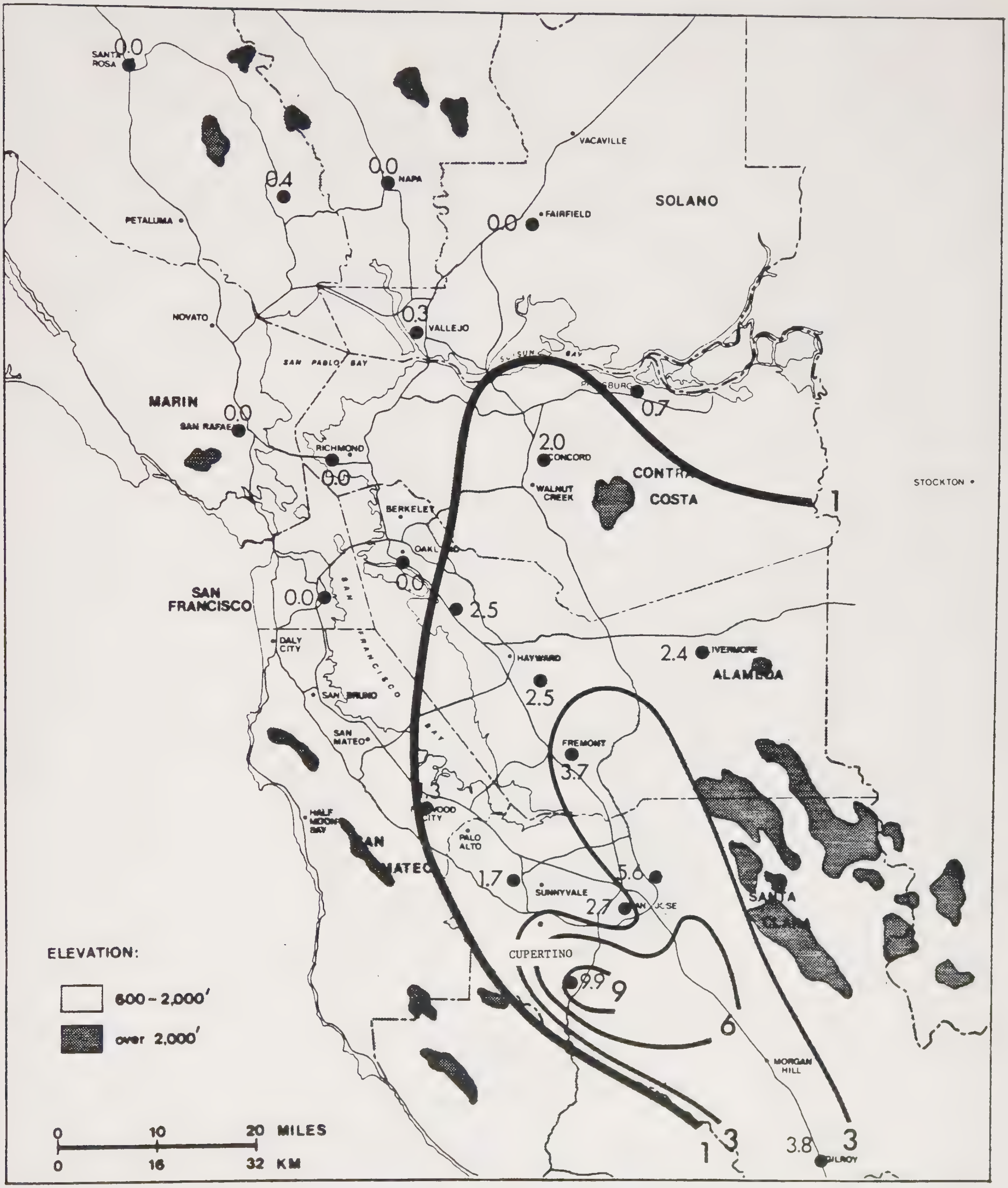
Sulfur oxides - are produced by processing and combustion of fossil fuels which have sulfur content. These gaseous pollutants are toxic to plants, deteriorate materials, and in combination with particulates, contribute to serious respiratory illness.

Temperature lapse rate - the normal atmospheric temperature profile which decreases as altitude increases. See Inversion*.

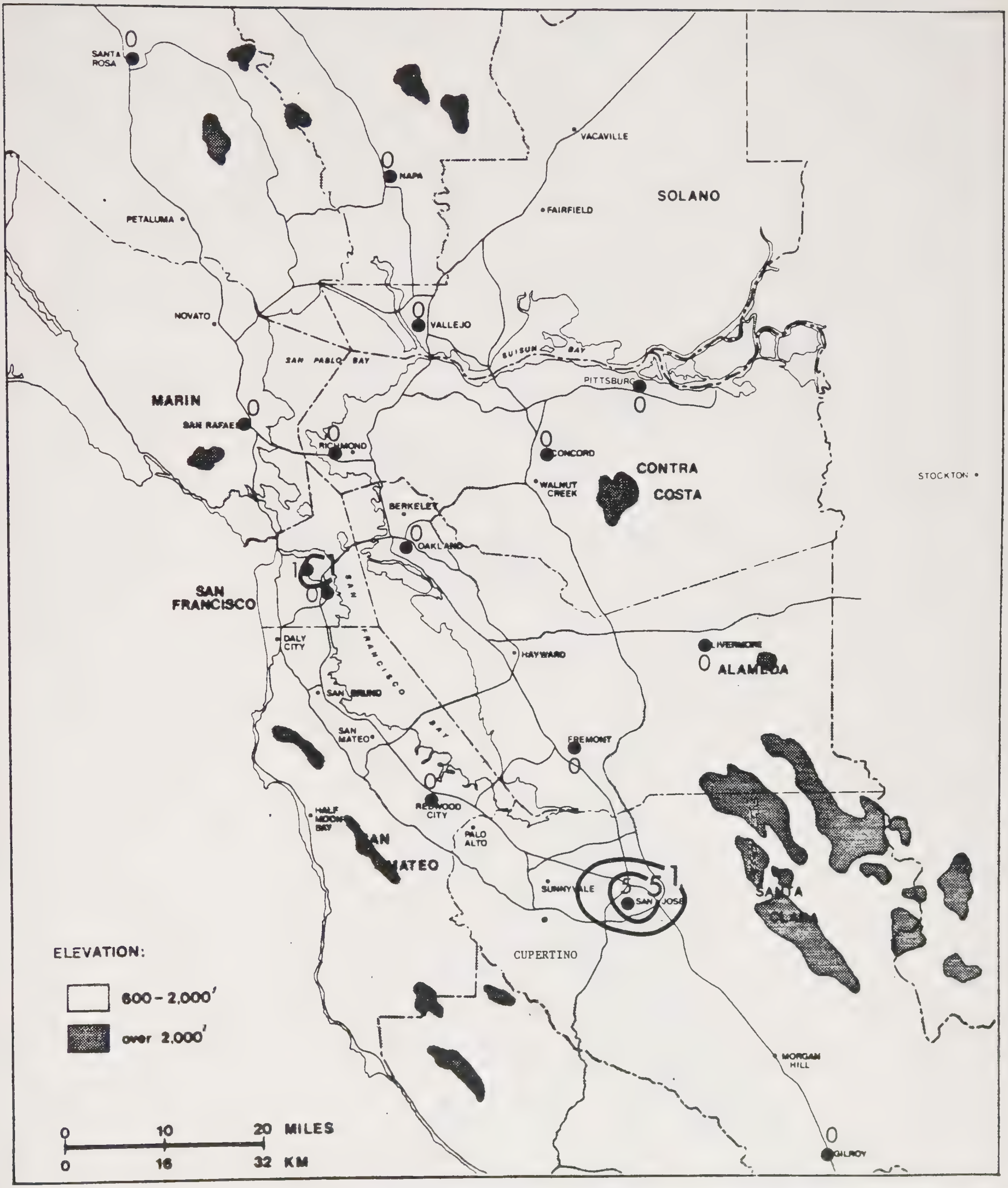
Transport - the movement of emitted pollutants by wind or thermal action.

Visibility reduction - is caused by suspended very small particles, water vapor, smoke, and gases with color.

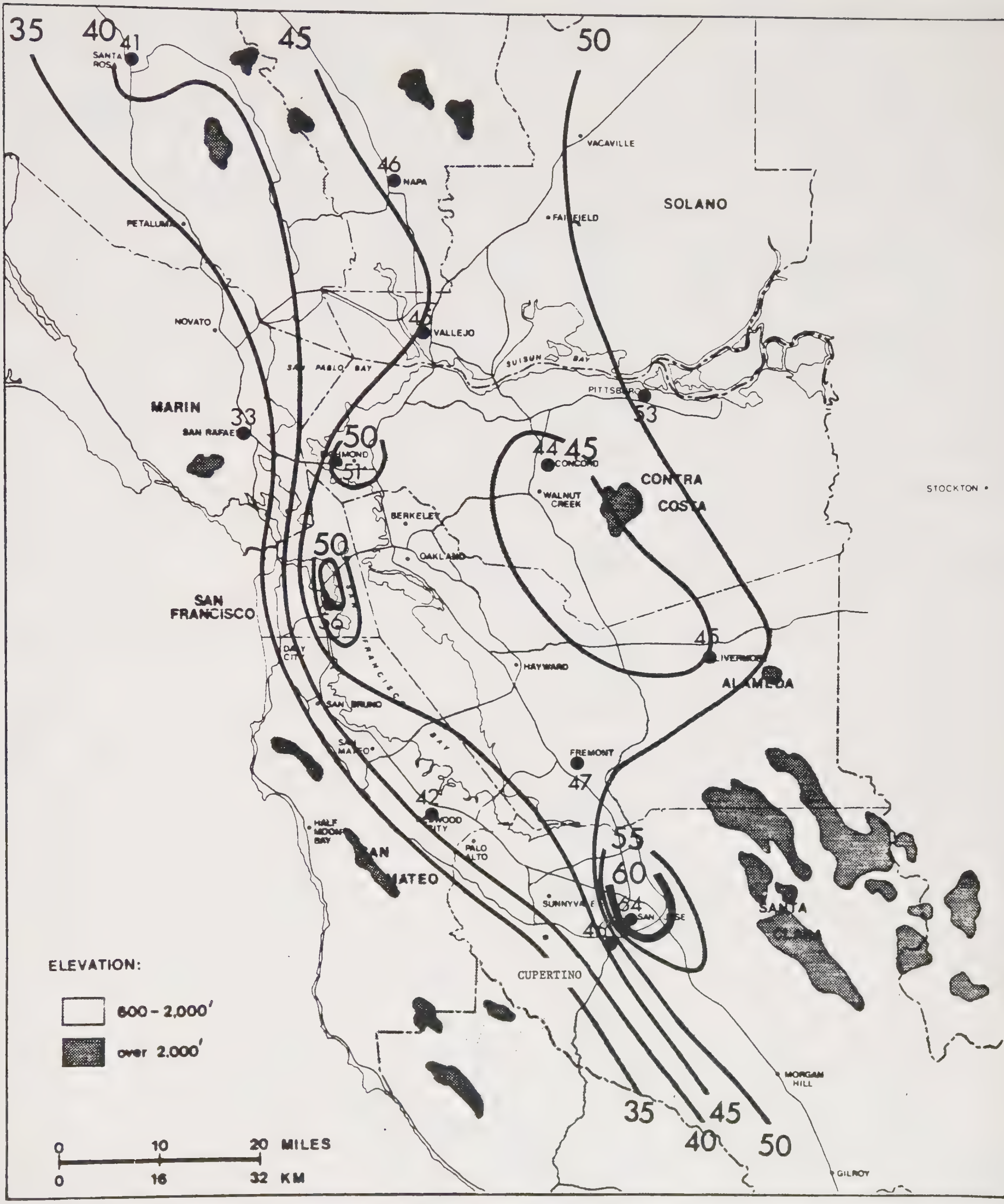
*defined elsewhere



1981 EXPECTED ANNUAL EXCEEDANCES OF FEDERAL OZONE STANDARD IN DAYS PER YEAR WITH MAXIMUM HOURLY OZONE CONCENTRATION EXCEEDING .12 PPM, BASED ON 3-YEAR AVERAGE (1979-1981)



1981 ANNUAL NUMBER OF DAYS WITH CARBON MONOXIDE EXCEEDING FEDERAL STANDARD (9 PARTS PER MILLION FOR 8 HOURS)



1981 ANNUAL GEOMETRIC MEANS OF TOTAL SUSPENDED PARTICULATE IN MICROGRAMS PER CUBIC METER (µG/M³), FEDERAL PRIMARY STANDARD IS 75 µG/M³.

Environmental Consulting Services

CO COMPOSITE CONCENTRATION MODEL

APPENDIX

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Receptor 1 - Location/Description MARIANI - DE ANZA BLVD

- Link A Description INTERSTATE 280 ⊥ Dist 180 m.
  Pk Hr Vol 11000 EM F(S) 22 (20) CP 6.4 8 Hr Vol 65,000 EM F(S) 11.6 (45) CA 1.0
  Wind Factors 1 — 2 — 3 4 .99 5 .99 6 .54 7 .41 8 .38 9 .41 10 .54 11 .99 12 .99 13 — 14 — 15 16
- Link B Description HOMESTEAD RD ⊥ Dist 180 m.
  Pk Hr Vol 2800 EM F(S) 22 (20) CP 1.2 8 Hr Vol 17,900 EM F(S) 15.7 (30) CA 0.4
  Wind Factors 1 .41 2 .54 3 .99 4 .99 5 — 6 — 7 8 9 10 11 — 12 .99 13 .99 14 .54 15 .41 16 .38
- Link C Description DE ANZA BLVD ⊥ Dist 15 m.
  Pk Hr Vol 4200 EM F(S) 22 (20) CP 3.6 8 Hr Vol 22,600 EM F(S) 15.7 (30) CA 0.9
  Wind Factors 1 — 2 — 3 4 5 6 7 — 8 .99 9 .99 10 .54 11 .41 12 .38 13 .41 14 .54 15 .99 16 .99
- Link Description ⊥ Dist
  Pk Hr Vol EM F(S) CP 8 Hr Vol EM F(S) CA
  Wind Factors 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
- Link Description ⊥ Dist
  Pk Hr Vol EM F(S) CP 8 Hr Vol EM F(S) CA
  Wind Factors 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Accum Conc/Pk	0.5	0.7	1.2	7.5	6.3	3.5	2.6	6.0	6.2	5.4	7.8	8.9	2.7	2.6	4.1	4.1
Accum Conc/Avg	0.2	0.2	0.4	1.4	1.0	0.6	0.4	1.2	1.3	1.0	1.4	1.7	0.7	0.7	1.0	1.0
				E								W				

Receptor - Location/Description

- Link Description ⊥ Dist
  Pk Hr Vol EM F(S) CP 8 Hr Vol EM F(S) CA
  Wind Factors 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
- Link Description ⊥ Dist
  Pk Hr Vol EM F(S) CP 8 Hr Vol EM F(S) CA
  Wind Factors 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
- Link Description ⊥ Dist
  Pk Hr Vol EM F(S) CP 8 Hr Vol EM F(S) CA
  Wind Factors 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Accum Conc/Pk

Accum Conc/Avg